## CLAIMS

- 1. A sound diffuser with low frequency sound absorption, comprising:
- a) a body having a front surface configured to diffuse sound waves; and
- b) means incorporated into said front surface for absorbing sound waves below a desired cut-off frequency.
- 2. The invention of Claim 1, wherein said front surface includes a plurality of divided or non-divided parallel wells.
- 3. The invention of Claim 1, wherein said front surface includes a two-dimensional pattern of geometrical or irregular shape chosen from the group consisting of cylindrical, conical, and pyramidal, polygonal or rectangular.
- 4. The invention of Claim 3, wherein said shapes are separated by slots or holes.
- 5. The invention of Claim 4, wherein said incorporated means is formed in said slots or holes.
- 6. The invention of Claim 1, wherein said front surface comprises a compound curved shape.

- 7. The invention of Claim 1, wherein said incorporated means comprises a plurality of open slots.
- 8. The invention of Claim 1, wherein said incorporated means comprises a plurality of holes.
- \_9. The invention of Claim 8, wherein said holes comprise a first set of relatively large holes and a second set of relatively small holes.
- 10. The invention of Claim 9, wherein said sets of holes are arranged in rows of holes.
- 11. The invention of Claim 10, wherein each row of holes is located within a well of a diffusive surface.
- 12. The invention of Claim 10, wherein each row of holes is located across a plurality of wells of a diffusive surface.
- 13. The invention of Claim 1, further including an absorptive material overlying a rear surface of said body.

- 14. The invention of Claim 13, wherein said absorptive material is made of a porous absorptive material chosen from the group consisting of fiber glass, mineral wool, cotton and foam.
- 15. The invention of Claim 7, wherein the slots are narrow enough to provide significant low frequency absorption.
- 16. The invention of Claim 7, wherein the holes are narrow enough to provide significant low frequency absorption.
- 17. The invention of Claim 15, wherein said slots have a width of 0.1 to 1 millimeter.
- 18. The invention of Claim 16, wherein said holes have a diameter of 0.1 to 1 millimeter.
- 19. The invention of Claim 1, wherein a crossover frequency is chosen below which sound absorption takes place and above which diffusion takes place in accordance with required usage.
- 20. A method of making an acoustical device which absorbs sound below a crossover frequency and diffuses sound above said crossover frequency, including the steps of:
  - a) choosing a desired crossover frequency;

b) calculating a number of perforations to be formed in an existing diffuser and their respective areas by using existing standard acoustic formulations such as:

where f is the peak absorptive frequency, c is the speed of sound in air, S is the cross-sectional area of a hole, L is the apparent depth of a perforated sheet, and V is an enclosed volume in a cavity;

- c) forming perforations of desired dimensions through a front surface of said diffuser to create said device;
- d) designing a diffusive surface shape of said diffuser to create diffusion above the crossover frequency using techniques including but not limited to number theory and acoustical optimization;
  - e) installing said device.
- 21. The method of Claim 20, wherein said front surface includes a plurality of divided or non-divided parallel wells.
- 22. The method of Claim 20, wherein said front surface includes a two-dimensional pattern of geometrical or irregular shapes chosen from the group consisting of cylindrical, conical, pyramidal, polygonal or rectangular.

- 23. The method of Claim 22, wherein said shapes are separated by slots or holes.
- 24. The method of Claim 20, wherein said front surface comprises a compound curved shape.